The Brout-Englert-Lemaître Center

at

the Tournay-Solvay castle

The Brout-Englert-Lemaître Center for theoretical physics will be an excellence Center for the development of science and its dissemination at all levels of learning. Its activities will also reach out to the general public through informal meetings aimed at a large audience.

The emphasis will be placed on a rich set of events creating the opportunity to meet, discuss and work together for a wide range of audiences, including scientists from Belgian as well as foreign universities in different fields, teachers, science enthusiasts, and the general public.

This memo is intended to briefly present its motivation, originality and relevance, and summarise its initial mode of operation.

The BEL Center in a nutshell

The Brout-Englert-Lemaître Center will operate as a meeting point, promoting contacts and interactions between people from different geographical and/or cultural backgrounds. For example, it will offer a place to meet for:
- scientists working in different universities
- scientists working in different fields
- teachers
- science enthusiasts and the general public.

The Center will regularly organise different types of events, with an open mind, attitude and perspective towards science and society in general. With the existing solid backbone on Fundamental Interactions, it will extend to events in a wide range of topics (through open calls), both at research and outreach levels.

Why "BEL"?

The pioneering role of Georges Lemaître, Robert Brout and François Englert in promoting collaboration between Belgian researchers

Apart from being extraordinarily brilliant scientists, Georges Lemaître, Robert Brout and François Englert played a very pivotal role in fundamental physics in Belgium.

Based on their scientific prestige, but even more on their permanent curiosity and eagerness to discuss and extend our physics understanding of the world, they succeeded very early on in promoting scientific contacts between groups operating in different Belgian universities.

At the time, is was certainly no small feat for science to transcend the barriers (philosophical, linguistic, …) between the various institutions.

Shortly after François Englert's Nobel prize, and following his desire of sharing its impact with the Belgian scientific community, the Senate voted a motion [1] recommending the creation of the Brout-Englert-Lemaître Center.

Our goals

While some of these obstacles may seem obsolete today, maintaining collaborations alive and fruitful at a modest distance is no easy task. Recent progress in computer-based communication has, paradoxically, even worsened the situation. Getting together now requires an active attitude, relaying the strong impetus and teachings of those famous physicists.

It is by frequent contacts, by passionate discussions, sometimes over a cup of coffee and at the blackboard, that new ideas often emerge. Science is a collaborative effort and theoretical physics is no exception. Even more, it is in relaxed and stimulating environments that meetings become essential to promote inter-disciplinary developments and collaborations. For example, the experimental devices and the data analysis techniques developed in high-energy

physics are now essential for life and medicine scientists. Physics concepts have also a continuous deep impact on our view of our world and the universe.

One of our most important goals is the promotion of science and its methods to all of society, in order to increase awareness and provide information and critical tools to citizens, as well as to transmit the passion for science to the younger generations. Outreach will therefore be an essential activity of the Center. We name this program “BEL Dialogues”. A special program “Art at BEL” will be developed to materialize the ever - present parallels between Art and Science, with temporary exhibitions, for the benefits of both scientists and the general public.

By its location in close proximity to the four institutions involved in the scientific lives and works of Brout, Englert and Lemaître, the Tournay-Solvay castle constitutes an ideal venue for this initiative. Its easy accessibility and its quiet and convivial surroundings make it unique. The international character of knowledge also calls for the development of a clear international dimension. A first direction of action will be the organisation of thematic extended distinguished visitor programs, for which the Tournay-Solvay castle will provide office and working space. During such programs, Belgian scientists interested in the topics and/or working in close collaboration with the visitors will have the possibility to find temporary office space and to spend time at the castle.

Since 2013, experience around the Nobel prize has shown us the eagerness of the general public to learn more about fundamental physics and science in general. We will leverage on this natural interest to organise new and original outreach activities open to passionates of sciences as well as to the young generations. For example, we intend to organise events in a convivial and informal manner on weekends that will involve the general public, specialists from relevant disciplines, artists, science journalists, and teachers.
The Brussels Region, with its central location, and the fact that it hosts four of the major universities involved in the research of Brout, Englert and Lemaître, is playing a unique role by making the Tournay-Solvay castle available for those activities and providing support.

Practical Aspects

The Initial setting and its evolution

In order to showcase the goals and mode of operation of the BEL Center, we propose to start from what we know well (theoretical physics of the fundamental interactions), and organise a scientific program for extending the reach.

We will issue open calls for:

- The Topical Science Seminars series (one day), aiming at an initial frequency of 1/month (to be increased following demand and means), available to all science domains.

In parallel, we will develop our backbone of rich and diversified programs of seminars on Fundamental Interactions taking place at our four Universities, with the potential of 3 weekly joint seminars on:

- *Deductive approach:* Exploring the general laws and symmetries to our Universe (for instance, String theory, Gravitation, Supersymmetry, …).
- *Inductive approach:* From theory to experimental and observational data and vice-versa, to improve our current understanding of the fundamental interactions and to build and test new physics models (complete or effective).
- *Astroparticles and Cosmology:* Theoretical investigations in astroparticles and cosmology, where wealth of data on phenomena related to fundamental interactions is now available and will be expanded further by new facilities and probes, in particular gravitational waves.

Special attention will be paid to bridging different topics, promoting interactions between different lines of research and scheduling topics pertaining to other fields.

In particular, multidisciplinary workshops: Physics for Sciences could explore the applications of techniques (theoretical as well as experimental) born in the study of the fundamental interactions to other fields (e.g. econo-physics) and vice-versa (e.g. machine learning and artificial intelligence).

The practical requirements are for one-day meetings, with an attendance of at most 70 scientists (a 70-seat meeting room is foreseen), typically 2 lectures would be held (one in the morning, one in the afternoon), with office facilities for small-group discussions and a lunch break to encourage informal discussion.

<u>Distinguished international visitors</u>

Renowned scientists will be hosted at the Institute for several weeks (up to three months). The Center will provide office and working space for them as well as for scientists from Belgian (as well as international) colleagues in the same field. Such 3-months sessions would entail office space made available for 20-30 scientists (2 invited scientists, Belgian and international experts in the field, including postdocs and students, there on a temporary basis within the strict duration of the visiting program). It could be very interesting to organize 2 simultaneous invitations in different fields.

<u>Interdisciplinary meetings and outreach: BEL Dialogues.</u>

By its very nature, fundamental interactions physics probes at the deepest level the working of our Universe, including its cosmological evolution. The developments in our fields thus have profound

philosophical and ontological implications, as well as a large-audience interest. The same can be said of a number of other science topics (genetic or medical research, …)

Our goal is to enhance opportunities for establishing contacts among different fields, with a common interest in solving problems with tools from physics. The Tournay-Solvay castle provides an ideal location for such discussions.
On top of the open-call monthly seminar mentioned above, we intend to organize general public meetings (typically during the weekends). These wide-interest meetings, which could be called BEL Dialogues, will be an occasion to meet in a relaxed atmosphere with scientists in other fields, artists, professional science "communicators" (science journalists, for instance), high school teachers and interested members of the general public.

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[1]Motion 5 -2795/2, March 25th, 2014
